

REVIEW OF SUSTAINABILITY OF USE EFFECTIVENESS CITY BUS STOPIN SURAKARTA REGION

SYAIFUL

*Civil Engineering Department, Ibn Khaldun University Bogor, Indonesia
Doctoral Student Multidicipline Study Program, Bogor Agricultural University,
Kampus IPB Dramaga, Bogor Indonesia*

ABSTRACT

From the results of a study on the effectiveness of bus stop stops that exist along the road in the city of Surakarta and Karanganyar Regency and Sukoharjo Regency. The results of this study (prior to the enactment of SSA on Jalan Slamet Riyadi-Gendengan and Jalan Dr. Rajiman - Bunderan Baron) indicated that most of the existing shelters were unofficial stops. With the ease of access and passenger habits to find the nearest location to the final destination of the journey of prospective bus passengers. From the survey results in the field research is known that the official stop facility there are 11 locations on the path through which the city bus while opposite there are 9 locations. The condition of the shelter is good and some conditions need immediate repairs. Based on the existing data related to the state of the bus stop, the effectiveness of its use as well as the route permits and characteristics of the city bus in the Surakarta region, it can be concluded that an additional number of stops will be required. Along with the increasing growth of population and motor vehicles in this region.

KEYWORDS: *City Bus Stop, Effectiveness & Route Permit*

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1. INTRODUCTION

1.1 Background

Vehicles and public transport in the Surakarta region are part of the transportation system that is inseparable from transportation activities. The track under study is one of the main accesses into the city (Anonymous, 1996; Syaiful, 2005; Syaiful & Yena Elvira, 2017. The number of motor vehicles has the potential to cause congestion, but in the Surakarta area, this traffic jam is far from it (Anonymous, 1993; Syaiful, 2017a; Syaiful, 2017b). But there are other disturbing problems in terms of public transport users ie bus stops. In order for users of public transport infrastructure to feel comfortable then it is expected there is a kind of supervision from related parties in the care and place the proper functioning of the return bus. In the Surakarta region with the issue of the bus stop which is a bit of a problem with all its advantages and disadvantages. Especially the users who are very diverse and have the behavior and character of such prospective passengers (anonymous, 1992; Syaiful Syaiful, Zainal Abidin, 2017; Syaiful Syaiful, Mikhael Yuliantino, 2017; Syaiful, 2016). Also, the stop at the time of this research is insufficient. The bus stop is observed on the city bus line that passes through kartosuro, palur and in Surakarta. The tendency of the users of urban bus transportation, as well as urban transport that pass through this path, is still happening somewhere. Although already provided bus stop but

still not used maximally. For that, we need a study of the physical condition of the bus stop and how effective the use of the bus stop by the prospective passengers in this city bus line. The serious handling of this bus stop needs to be properly re-arranged so that the allotment of the shelter is in accordance with its function. The current stop is expected to work well by prospective passengers so that it can be used and achieved easily and quickly. Another cause that must be considered is that the location of the stop does not make any traffic jams in every stop (Anonymous, 1993).

1.2 Research Objectives

The purpose of this study are:

- Record existing shelter facilities and re-plan new shelters according to the needs of city bus users and urban transport in the Surakarta region.
- Provide inputs to local government in the Surakarta region on the review of the current location of the shelter.

1.3 Research Benefits

- The indirect benefit of this research is as an input to the planning of the stop facility in Surakarta area in the future in improving the service for the passenger of city bus and city transportation.
- As a manifestation that bus stops in the Surakarta region can support government programs as a traffic order area (KTL) on the main line in the city of Surakarta.

1.4 Limitations of research

Limitations of research are adapted to the purpose of research are:

- The location of this research is set that is along Jalan Slamet Riyadi Kartasura, Jalan Slamet Riyadi Surakarta and Jalan Dr. Rajiman Surakarta.
- This study only re-catalogs existing shelters and establishes existing and existing shelters for existing and possibly proposed shelters as new bus stops for city bus passengers and city transport.

1.5 Definition of Bus Stop

The bus stop is a public passenger stop to lower and or raise a passenger with a building. Bus stops/stops are places to drop off and /or raise passengers (Anonymous, 1996).

Bus stops are locations where passengers can ascend and descend from buses and locations where buses can stop to raise and lower passengers according to operational arrangements or passenger demand (Santoso, 1996).

1.6 Public Transport

Public transport is any motor vehicle provided for public use with free of charge. Further description of public transport on the determination of route structure, route permit requirements and processes, guidelines and tariff setting (Anonymous, 1996; Anonymous, 1992). Public transport performance standards based on studies in developing countries are shown in Table 1 below (Sutiono, 2000).

Table 1: Public Transport Performance Standards

No	Criteria	Value Standard	Units
1	Waiting time <ul style="list-style-type: none"> Average Maximum 	5-10 10-20	Minute Minute
2	Walking distance <ul style="list-style-type: none"> Solid areas within the city Low density areas within the city 	300-500 500-1000	Meters Meters
3	Moving modes <ul style="list-style-type: none"> Average Maximum 	0-1 2	Minute Minute
4	Journey time <ul style="list-style-type: none"> Average Maximum 	1-1,5 2-3	Hours Hours
5	Travel expences (percentage of income)	10	%

In determining public transport deserve route permit and route structure, as well as the traffic path that passes and which stops, will be passed first determined the number of fleets that will serve the path. Once the path is determined then set permit route. Thus the path of the city road network to be traversed must be sterile first from the transport that does not get the permit. Below is shown a map of the Surakarta city road network and a network pathway that passes through the scope of this study. Figure 1 below:



Sources; <http://googleMapsSurakarta>, 2018 access July 24 2018, 09.00 AM

Figure 1: Map of Surakarta and Sukoharjo Road Area Networks

The development of transportation in the Big City causes congestion (Sutiono, 2000). Subsequently submitted also the increase in the number of vehicles not followed by the addition of the number of road segments resulting in the emergence of new problems of congestion (Anonymous, 1993).

1.7 Stop Bus Planning Criteria

Actually, in principle, shelters are required to exist along public transportation routes so that the reliability of public transport can be maintained and the disruption of traffic flow is expected to be minimal.

Divided into 2 kinds of bus stops: the bus stop and the shelter. What determines the type of shelter is the level of use of the shelter itself, as well as the availability of available land and environmental conditions. For more details, the selection criteria for the type of protection are based on Table 2 below (Anonymous, 1996).

Table 2: Criteria for Selection of Types of Protection

No	Criteria	With Protection	Unprotection
1	Usage rate	High	Low
2	Land linkages	Enough	Not enough
3	Environmental conditions	There are other protections such as trees	No other protection such as trees

The distance of the shelter is determined by three things: the passenger running distance, the number of requests at the relevant location and the level of disruption to traffic. Thus the number of requests does not specify the size of the stop. The size of the shelter uniform while varied is the installation distance based on Table 3 below (Anonymous, 1996).

Table 3: Distance of Bus Stops and Bus Stops

No	Land Use	Location	Distance Stop (m)
1	The center of activity is very crowded	CBD, City	200-300
2	Solids, offices, schools, municipal services	City	300-400
3	Urban settlements	City	300-400
4	Mix solids, housing, schools, services	Suburbs	300-500
5	Rare mixes, housing, fields, rice fields, vacant lots, outskirts	Suburbs	500-1000

1.8 Determination of Halte Locations

Determining the location of shelters for public transport should meet the following requirements:

- Close to the activity center that generates users of public transport.
- Located on a pedestrian path (footway).
- Safe against traffic accidents, so there must be an arrangement of vehicle movement, stop and pedestrian users.
- Does not interfere with the smooth flow of traffic, either the flow of traffic on the road or on the road meeting.
- Safe against criminal interference, so the stopping place should not be hidden.

1.9 Stop Bus Facilities Planning

Planning of the required shelter facilities is, among others, determined by community aspirations (survey results) and taking into account the technical, economic and environmental aspects.

The main and support facilities planning at the bus stop are:

- The place is shady and there is protection.
- The passenger-waiting stop does not interfere with other pedestrians and is safe against nearby traffic.
- There is a place to stop the vehicle along with signs and road markings, where the stop is usually on the road.

- There is information about bus schedules and bus routes.
- There are pedestrian crossing facilities
- There is a safety fence, so pedestrians do not cross over the place (Anonymous, 1996).

2. METHODS

2.1 Location and Place of Study

The location of the study was conducted on the city bus line in the Surakarta area. This location is chosen that prior to the enactment of SSA at the above-mentioned points. An infrastructure of bus stops shows a tendency of the tendency that city bus and city transportation with its service tend to less satisfactory. Still often encountered city bus officers and city transportation to raise and lower passengers disembarang place. This is also due to the tendency of prospective passengers who do not pay attention to the signs that have been installed at each stop. Selection of this location will be able to help and become a consideration in increasing the function of shelters and unofficial shelters as infrastructure for prospective passengers of city bus transportation in accordance with the needs and demands in the field. This location is all the point for prospective passengers who wait for city bus or city transportation every day with the assumption that preliminary research about the point of candidate location has been done. The data obtained are about 10-20 passengers waiting at each point to be surveyed for every 15 minutes of the arrival of prospective passengers.

2.2 Data Collection Period

The period of data collection is conducted on an appointed day ie Monday and Thursday for the survey of traffic volume on the road and public transport frequency and a number of passengers at each stop. The data collection time for the existing location selection is done on Tuesdays and Saturdays, ie traffic conditions in normal times. Survey of city bus traffic frequency and city transport volume is done during peak hour and morning peak hour. From the results of the preliminary survey in the field, the morning rush hour at 06.30 - 08.30 WIB and the afternoon rush hour is done at 11.30 - 13.30 WIB.

2.3 Flow Chart of Research

In the research is shown a flowchart of research by assuming the primary data is done before the research in the field, so first need to do data collection through the process of analysis of city bus and city transportation in the Surakarta region. Furthermore in Figure 2 presented a flow chart of the study.

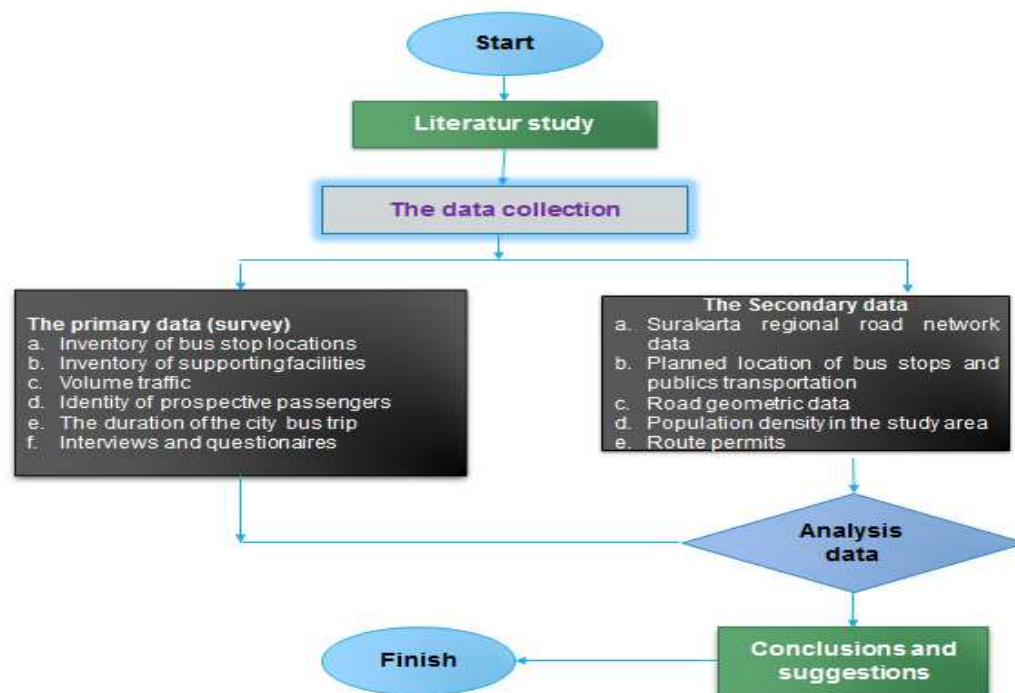


Figure 2: Flow Chart of the Study

2.4 Data Collection in the Field

1. Primary Data

- Location data of shelters and supporting facilities at existing shelters (official and unofficial) in the Surakarta region.
- Amount of traffic volume of the city bus in Surakarta region
- Number of prospective passengers at the bus stop frequently used by passengers of the city bus.
- Collecting bus frequency data in the Surakarta region.
- A distance of travel destination from the bus stop, length of waiting for time and city bus service available (from interview).

2. Secondary Data

- Number of the road network in Surakarta city.
- A number of bus stops location.
- A number of population density in Surakarta city
- What is the speed of the city bus operating in the Surakarta region
- The existence of data acceleration, the deceleration of vehicles from the study of standardization of city bus.

2.5 Data Collection

Data collection is done by conducting surveys in the field, either in the form of primary data collection or secondary data collection.

1. Primary Data

- Data from interviews of prospective bus passengers including general data, distance from stop destination, long waiting for city bus, waiting time for city bus, reason for waiting at the location, safety and hygiene of existing shelter location, opinion of prospective passenger about facility desirable supporters and passengers' opinions regarding the preferred shelf form. Data collection is done by conducting interviews directly to the respondents by using questionnaires containing questions and choices of answers that have been available. Respondents consist of groups of students, employees, general and students.
- Data of City Bus Number
- A public transport frequency data collection is done by way of observation and calculation directly on the side of the road, statically on public transport in a period of time by one hour during peak hours.
- Data on the number of passengers waiting at several stop locations (official and unofficial).
- This data collection is done directly by doing the observation at the stop location by calculating the number of passengers that exist per one hour. This data is used for calculation in the shelter planning.
- On-premises facility inventory data based on several criteria, ie types of stops, distance to previous stops, land use around the site, stopping conditions, existing access crossing facilities/agree.
- Inventory data of existing supporting facilities in place of stopping

1. Secondary data

Secondary data collection is done by contacting the parties related to the existing policy on the Surakarta municipal government about the tracks studied and the appropriate data required and survey results from several studies related to the analysis of bus stops of the city characteristics of the existing city bus.

2.6 Research Tools

The research equipment required during the survey, both in the preliminary survey and the main survey are survey forms and stationery, clipboard, meter, stopwatch. The use of TDC is intended to save the surveyor personnel because with this tool 1 (one) road segment requires only 1 (one) surveyor alone and to calculate the traffic volume for two movement directions at once.

2.7 Hypothesis

The hypothesis of the research can be formulated by:

- Bus stops in the city of Surakarta have not maximized its utilization based on the distance and location where the shelter is located, this is evident from the development of prospective passengers waiting for the city bus transportation is still spreading.

- Planning for bus shelters either official or unofficial bus is the demand for the service of the bus stop itself to reduce traffic disturbance in congestion-prone points in the Surakarta region.

2.8 Data Processing

Data processing is done based on the rules and conditions set by the government such as the provisions of the Directorate General of Land Transportation in the Technical Guidelines of Engineering Place of Public Transport Passenger Stops and supported by several other provisions.

To support the results of the analysis used statistics with one sample test or t-test. this test is also commonly referred to as a one-tailed test (one tail test), because the critical area is on one side: the right side. This analysis is intended to know at any point in the region of Surakarta require facilities stop. The existing hypothesis is based on the standard condition (Anonymous, 1996) that if at a point of stopping the number of passenger candidate exceed 20 person / 15 minute then at that point require stop facility. So the hypothesis is:

H₀: prospective passengers at a point ≤ 20 people / 15 minutes

H₁: prospective passengers in a point ≥ 20 people / 15 minutes

With the significance level = 0.05 obtained the critical area:

H₀ is rejected if $t > t(0.05; n-1)$: H₁ is accepted if $t < t(0.05; n-1)$

3. RESULTS

3.1 Results from Research

The result of research about bus stop facility in Surakarta area is intended to know the actual condition in the field. The results of this study indicate that most of the existing shelters are unofficial. Due to the emergence of ease of access and passenger habits to find a location close to the final destination of the travel prospective passenger bus city and city transportation.

3.2 Research Discussion

From the survey results revealed that the official stop facility there are 11 point stop location on the path through which the city bus and city transportation while opposite there is 9 point stop location. His condition is still functioning well and part of his condition needs to be rehabilitated.

In the inventory data survey, it was found that the number of stops and the distance between one halts eke halt the other and the condition of the existing shelter can be described that the closest distance is 100 meters and the most distant distance is 482.97 meters. With a very varied range, it is necessary to add the number of bus stops and supporting facilities. Also adjusted to the conditions on the road that is on the Jalan Slamet Riyadi, Jalan Slamet Riyadi Kartasura, and Jalan Dr. Rajiman Surakarta.

4. CONCLUSIONS

4.1 Conclusions

- The number of stops recorded at the time of the study was 17 points/location and only 11 official stop location points, while 6 unofficial stops, causing city bus and city transportation to stop between 100-200 meters along the track which is passed.
- From the results of data analysis of the distance between bus stops based on the consideration of the number of vehicles occupancy is 482.97 meters, while based on the convenience of service users is 425.83 meters.

4.2 Suggestions

- It is expected that the Sukoharjo and Surakarta district governments evaluate the existence of the existing bus stops so it is possible to build new shelters according to the demand in the field.
- If the review again based on the distance according to the situation in the field then still in accordance with the results of the calculation of the occupancy of the number of vehicles, the distance is less than 500 meters, the result is still under the applicable provisions.
- This research recommends to the relevant government to conduct the further study that there are 6 unofficial stop points to be considered for building new stops in accordance with the concept and recommendation of MAT of the Republic of Indonesia.

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